Therapeutic Metaphors in Engineering: How to Cure a Building Structure

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Abstract. Cognitive linguistics have conscientiously pointed out the pervasiveness of conceptual mappings, particularly as conceptual blending and integration, that underlie language and that are unconsciously used in everyday speech (Fauconnier 1997, Fauconnier & Turner 2002; Rohrer 2007; Grady, Oakley & Coulson 1999). Moreover, as a further development of this work, there is a growing interest in research devoted to the conceptual mappings that make up specialized technical disciplines. Lakoff & Núñez 2000, for example, have produced a major breakthrough on the understanding of concepts in mathematics, through conceptual metaphor and as a result not of purely abstract concepts but rather of embodiment. On the engineering and architecture front, analyses on the use of metaphor, blending and categorization in English and Spanish have likewise appeared in recent times (Úbeda 2001, Roldán 1999, Caballero 2003a, 2003b, Roldán & Ubeda 2006, Roldán & Protasenia 2007). The present paper seeks to show a number of significant conceptual mappings underlying the language of architecture and civil engineering that seem to shape the way engineers and architects communicate. In order to work with a significant segment of linguistic expressions in this field, a corpus taken from a widely used technical Spanish engineering journal article was collected and analysed. The examination of the data obtained indicates that many tokens make a direct reference to therapeutic conceptual mappings, highlighting medical domains such as “diagnosing”, “treating” and “curing”. Hence, the paper illustrates how this notion is instantiated by the corresponding bodily conceptual integration. In addition, we wish to underline the function of visual metaphors in the world of modern architecture by evoking parts of human or animal anatomy, and how this is visibly noticeable in contemporary buildings and public works structures.

Keywords: ESP cognitive approach; metaphor; blending; conceptual integration; engineering and architecture representations.

1 Introduction

When I started working in the academic world of civil engineering some years ago and I began to become familiar with their jargon in both English and Spanish, I noticed some striking features. For example, a good number of linguistic terms were borrowed from the medical domain. They were not just related, they were the same. My first impression soon became a fact when I started gathering written (books, journals, manuals) and spoken material (interviews and lectures by engineers) about this subject matter.

One of the best-selling books in the School where I work has the title of *Patología de las Estructuras* 'Pathology of Structures,' by Prof. Calavera, a respected Spanish civil engineering scholar. As a matter of fact, courses labelled with this or similar names from the field of medicine are not at all unusual. Websites named "Building or Construction Pathology" can be easily found on the Internet. Likewise, I learnt that engineering activities involve the use of *auscultation devices* for dams, that *bleeding* is an undesirable effect in different types of concrete and that metal beams may suffer from *stress* and *fatigue*. All this confirmed that some metaphoric mappings are common in engineering. For engineers, the use of these conceptual mappings has become completely entrenched in their way of thinking, reasoning and communicating, and most of the time they are not even aware of it.

Therefore, after this verification, the next step was to learn the reasons why some specific mappings and metaphors were more salient in both English and Spanish civil engineering. This task seemed to be worthwhile in order to acquire a better understanding of engineers' ways of thinking and categorizing. After all, as Fauconnier remarks: "Language is only the tip of a spectacular cognitive iceberg" (1999).

Typically, engineers' jobs include the design of big structures, as well as solving problems that may affect these structures. For example, they are concerned with how to solve the problem of crossing a river by the construction of the most suitable bridge or how to link two distant towns by means of a highway. Bridge constructions, for instance, must meet standard criteria and fulfil technical conditions such as the ability to withstand opposing forces and bear various types of loads over their decks. On the other hand, any bridge is situated at a particular place and surrounded by a unique environment. Building a road bridge is not the same as building one across a bay. One solution to help manage the complex and sophisticated techniques involved in bridge construction is to treat bridges as living creatures, i.e. having a lifespan and a type of behaviour/performance, and hence to monitor their physical condition through convenient technical methods. Accordingly, bridges' health should be regularly checked to avoid major mishaps due to *fatigue*, *decay* or *stress*.

This type of reasoning is done in a conventional way, similar to the way that we use and understand idioms. For instance, if someone advises us about not "throwing in the towel", we do not actually think of a towel, or about being in a boxing ring. Instead, we understand that we are being encouraged to overcome some sort of hardship. In the same way, during their work, engineers are not consciously thinking of the borrowed mappings they are using. They just apply them automatically, since this technique has been previously assimilated during their training. The moment they are exposed to this type of language, everything clicks into place for them.

It is true, however, that medical practice and engineering share certain characteristics, including a similar pragmatic approach to the job. In today's world, engineers have to deal with uncertainties and risks; they have to apply probabilistic theories and consider a lot of variables when making decisions. Both engineers and physicians know that they are dependent on obtaining reliable contextual and perceptual information and must rely on technical tools to get data (Blockley 2005: vii–viii). In Calatrava's words, engineers are concerned with the "empiric, the experimental understanding of the reality" (2008: BBC interview). As in medicine, civil engineers frequently hold the lives of others in their hands; therefore the engineering profession includes learning from errors. For example, the Tacoma Narrows bridge collapse in the state of Washington remains a prototypical case study for engineers of why suspension bridges may fail and result in loss of life. Therefore, examples like this are exhaustively studied for future prevention by means of laboratory or field analyses or by performing *autopsies of defunct constructions* (Pathology Construction Website).

The main aim of the present paper is to focus on the use of medical language as a major input for expressing civil engineering concepts. It is true that there are cases of civil engineering terms actually used as source domains to convey abstract concepts, as in *cementing a friendship,* or in colloquial English *hitting/going through the roof* (becoming furious); or in *the glass ceiling* (applied to women's career obstacles). Some uses may actually target the medical domain, as in colloquial Spanish: *Estoy para el desguace*, literally: 'I am ready for the scrapyard,' but actually meaning: 'I'm feeling shattered or in terrible condition'. We will not consider this type of examples in this study, however; instead we will concentrate on inputs from the therapeutic domain onto the engineering one.

The conceptual integration framework proposed by Fauconnier (1997) and developed in Fauconnier & Turner (2002) is followed, as the most appropriate framework for our purposes, because it provides a more complete model than earlier metaphor theories. It is considered more unifying, because the conceptual integration stance encompasses conceptual and image metaphor, blends, categorizations, frames, counterfactuals and metonymies. Examples of medical blends in engineering will be shown, as well as examples to illustrate the importance of perception (visual representations) in engineering, including "image blends" in various descriptive examples, as analysed below.

2 Initial corpus collection

A preliminary phase of this study consisted of collecting a corpus of engineering keywords and their main collocations, to create a representative sample (Roldán and Protasenia 2007). The preliminary aim was to identify engineering words related to the medical domain. The corpus is comprised of 81 journal articles of *Revista de Obras Públicas*, which is the authorized professional journal for chartered Spanish civil engineers (Ingenieros de Canales, Caminos y Puertos). The articles are from January 2000 to December 2004. Concordances, frequencies, clusters and keywords were subsequently extracted and analysed by means of AntConc 2006 software and by applying the OU CREET procedure for metaphor analysis in discourse. Other corpus approaches for identifying metaphor such as those carried out by Charteris-Black (2004), Caballero (2003a, 2003b), and Deignan (2005) also served as references when undertaking this work.

Indeed, the widespread use of metaphor in architecture or in civil engineering has been already noted in Spanish and English (Caballero 2003a, 2003b, Úbeda 2001, Roldán 2004). Here, as in many other

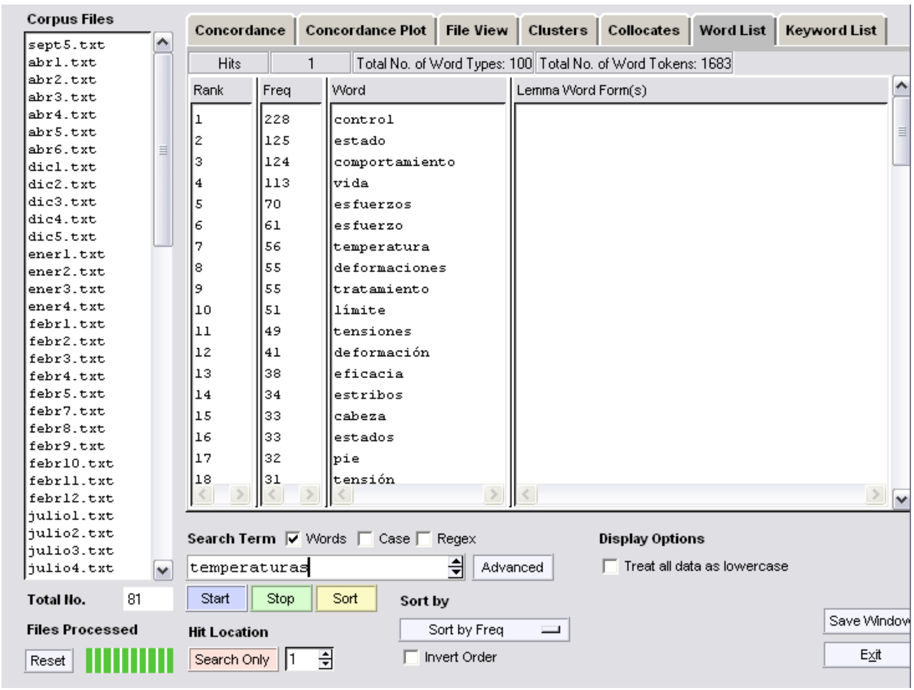

Figure 1. Frequencies of the term *control*.

realms of language, metaphor appears to be pervasive. The civil engineering corpus collected supports this idea, since a considerable number of terms in the sample have links with human body input. Interestingly, the highest frequency of terms, as shown in Figure 1, corresponded to *control*, and a closer examination of the concordances of this term suggests that the meaning of *control* is very similar to *monitoring*, i.e. when the engineer checks a structure to follow up its behaviour (Figure 2).

The equivalent mapping in the medical domain is checking someone to prevent or to cure a possible illness. This parallelism emphasizes the importance of embodiment mappings in civil engineering, and as we will see below, embodiment will also be characteristic in other conceptual operations such as counterfactuals, metonymy, frames and categorizations. Therefore, as stated above, we maintain that given the complexity and the variety of conceptual and perceptual mappings that can be detected in engineering communication, the science of blending is the best tool currently

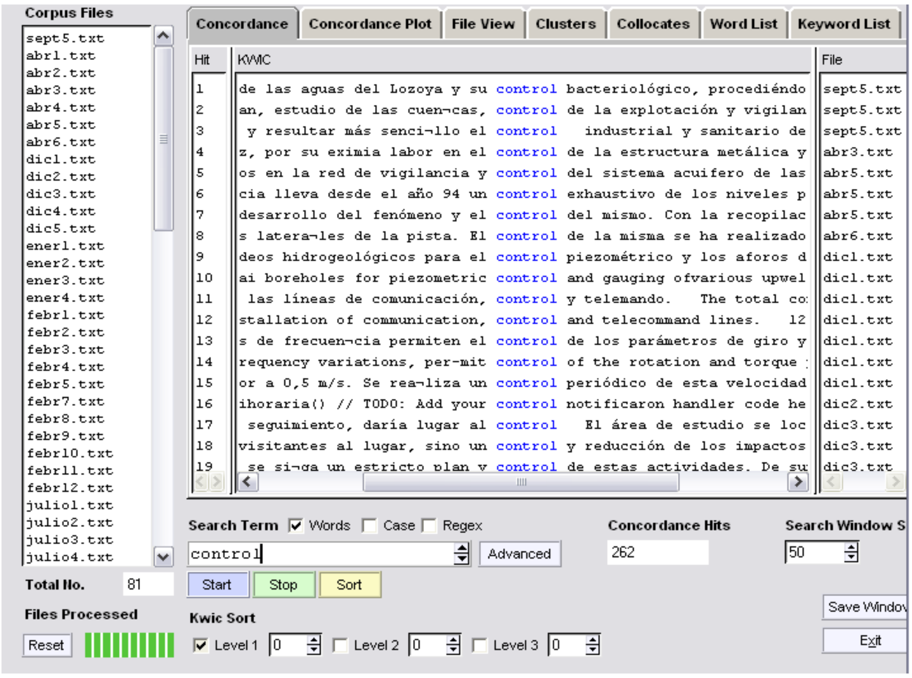

Figure 2. Concordances of the term *control*.

available. Hence mental space theory and blending (conceptual integration) theory is particularly well suited for explaining the construction of meaning in engineering.

In blending or conceptual integration, selective projections are made from the target and the source inputs. The links between the inputs and the resulting blend usually create an emergent innovative structure that can be interpreted through *patterns of compression or decompression* (Fauconnier & Turner, forthcoming). The inputs consist of *mental spaces* that are conceptual containers of basic information. They are connected to *frames*, which are schematic structures based on experience and related to memory and to previous knowledge. Basically, we can find at least four connected mental spaces: *two inputs* linked by *cross-space mappings*, a *generic space*, and the resulting *blend* that contains an *emergent structure* different from the generic space and the inputs. A series of operations may be involved, such as composition, i.e. a selection from the inputs to the blended space; completion, i.e. completing the scenario with previous or background information; and elaboration, i.e. creating (emerging) structure not predictable from the inputs. The cross-space mappings connect matches and their counterparts in the inputs. One paramount aspect about blending is that it is a dynamic process, since novel mappings are constantly emerging; it is like some sort of work in construction, unfinished and ongoing. And it is through cognitive patterns such as compression and decompression that information is processed and put to use. As human beings, we possess frames, background knowledge, long- or short-term memories of scenarios, situations and experience that can be activated and updated at any single point when necessary. In engineering, there are specific conventional mental spaces that can be activated. These mental spaces consist of particular frames which when connected with other spaces may result in integration networks that will deliver emergent structures. For example, the "engineer respecting the environment" frame and the "engineer taking care of people" frame, which will be seen below, are quite recent and innovative in engineering. The emergent structure of this particular blend is currently very productive. From the complex interrelations of blending networks and vital relations, compressions and decompressions operate in the emergent structure. The networks may show links between the inputs, which according to Fauconnier & Turner (2002: 92–93) correspond to "outer-space links", with those inside the blend accounting for "inner-space links".

For example, in Figure 3 the mappings show the cross-space mapping links from the borrowed medical roles and frames of physicians, diseases, symptoms, diagnoses, cures, and treatments applied to the engineering roles and frames that comprise bridges affected by structural problems, in this case *fatigue*. There is a generic space that is shared, i.e. the existence of a problem and the need to solve it by following a pragmatic and empirical approach shared in the medical and the engineering mental space inputs. However, since they are two very different scenarios (i.e. a surgery or a hospital vs. the specific location of the bridge), contrasting roles and dissimilar symptoms, emergent structure is created in the resulting blend. The medical domain acts as a sort of scaffolding to prop up ad hoc structures required in the engineering domain. The selected repertoire

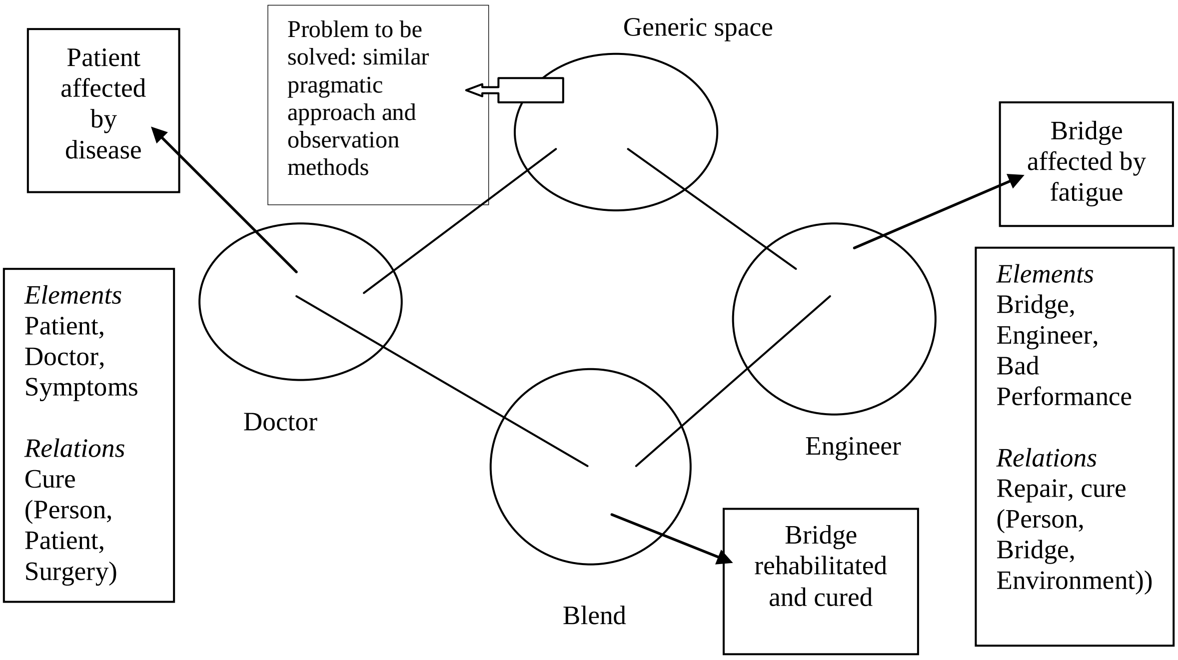

Figure 3. Bridge *rehabilitation*

is not whimsical, but precise. It fits into a specific pattern, covering only various engineering aspects, like *fatigue* or *stress* as diagnostic symptoms and *rehabilitation* as the suggested treatment. This means that the input that is coherent at the human scale (the medical input) provides coherence to the other input (engineering), so that the former has been compressed when projected into the blend. The symptoms (*fatigue*), which are also in the blend, have to be decompressed by the doctor-engineer, since the cause of the illness-problem is compressed in the specific symptoms. Inferences result because of the interacting links in the inner spaces of the blend, delivering possible solutions for the bridge, such as its *rehabilitation*. This includes the environment where the bridge is situated. So, in the final blend we find the following conceptual relations: cause-effect (because of the intervening action), change (from initial state A to final outcome B, identity (roles of doctor-engineer) as well as part/whole relation links (only some elements are highlighted: e.g. the *fatigue* problem). These elements are compressed either by scaling (the condition of the structure can be better or worse) or by syncopation (only some aspects of the process affecting the structure are relevant enough to be activated in the blend, e.g. its lack of strength).

In addition, there may be two alternatives in the condition of the bridge with structural problems. One is the current faulty condition and the other the desired counterfactual state which the engineer wishes the bridge to achieve when repaired. For example, if it is experiencing a settling problem because of poor subsoil, then the foundations must be reinforced. In one blend the structure is unstable and weak. In the second case, the engineer has solved the instability problems. Most of the time, engineers work with probabilistic methods and calculations, not deterministic ones, and therefore a lot of uncertainty and risk exist in engineering decisions. There is not just one right or correct answer to the problems that engineers face, so they are trained to try different possibilities to resolve difficult or doubtful issues. In the blend that was analysed above, the consideration of playing the medical role to attend a patient (the structure) is only evoked, not explicitly felt, because the blend forms part of the engineer's expert training, acquired during the whole training process involved in becoming an engineer.

3 Engineers' blends and networks

In Fauconnier & Turner (2002: 129), various types of networks are developed. For example, there are single-scope networks, where interconnected links occur in two domains. The example they proposed is cross-mapping domains from boxing input and economics input, which convey inferences between fighting-struggle and business. As Fauconnier & Turner put it, despite the strong asymmetry between the inputs, the resulting network gives us the feeling that one of them (boxing) provides insight into the other (economics). If we translate this point to our discussion, the inferences are that an engineering structure needs medical attention, because of *embodied* problems/symptoms such as:

- *bleeding*
- *stress/strain*

- *fatigue*
- *collapse*

The resulting blend has inherited structure from the medical input and implicitly includes the conventional metaphor of structures as human beings, which eases the task of establishing links between both inputs. However, the two main agents in this network, the doctors and the engineers, are not actually counterparts in the frame of the inputs: the engineers are not exact counterparts of the doctors, but rather of what they do, i.e. solving problems. In the one case they look after big structures and in the other they take care of patients. As shown in Figures 4 and 5, there are multiple spaces and complex conceptual integration networks in engineering. An engineer has in mind many spaces and frames; some of them may limit the scope of their projects and act as constraints in the construction process. Some of these spaces are:

- that of the materials to use or previously used
- that of aesthetics
- that of building, local and urban regulations
- that of mathematical calculations
- that of geological conditions
- that of environmental laws
- that of the budget
- that of security for people
- that of the team of people to work with
- that of the culture and language where the structure will be located

At all times they must consider the effect of their work on the environment and also the whole life impact of the structure on the outside world. For example, in the mental spaces employed when designing a bridge, the main conceptual relations are *time, cause–effect, intentionality, change, identity,* and *representation*. The *time* relation exists in the sense that building or repairing a structure takes time. There is also *cause and effect*, from the initial state A to the final product B, as well as the *intentionality* to do so. This also includes a qualitative and quantitative *change* from the first condition to the end-result condition, having a series of successive stages in between. Finally, there is what the structure represents (*representation*). Therefore, when conceiving of a structure, there is an anticipation of its good or bad potential performance. Additionally, one major factor that the engineer must consider is the effect that the structure will have on people. As seen above in the engineer-as-a-doctor blend, the emergent structure compressed in the blend entails the metaphor of the structure as being human, i.e. the "humanization" of the structure, and therefore deserving of care. But going one step further, there are links connecting the welfare of people in bodies—which is sought after (responsible: doctors)—and the welfare of the people in the structure (responsible: engineers), as shown in Figure 4. From this emergent structure, the degree of satisfaction of the people using the structure is inherited, a welfare which is not only physical, but also aesthetic (Figure 5). This is a double-scope network (Fauconnier & Turner 2002: 132) because the different organizing frames of the inputs contribute to the blend in an innovative way. For example, the welfare of people in a building is about people feeling comfortable in it, including the right quantity of light (not too bright or too dim) and a pleasing visual environment through the design of windows and lighting systems; the absence of distracting noise; the right temperature and ventilation.

Likewise, when the external appearance of the building is

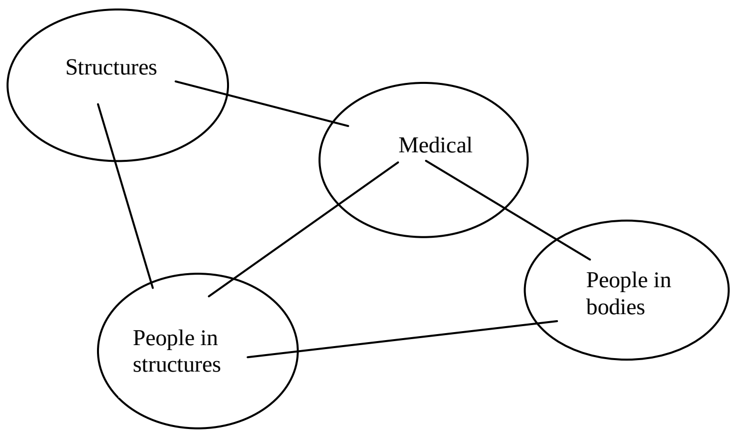

Figure 4. Interrelated medical-engineering networks.

aesthetically pleasant, this may facilitate the internal well-being of people in the building (better health) as well as their enjoyment. Actually, if this aim is achieved in different structures, and care is taken as regards the earth's resources and pollution control, this would have the desired effect of living on a healthy planet. In Figure 5 we see the links connecting the networks between the external look of the structure and the internal well-being of the people who use the structure and between the aesthetic appearance of the structure and the enjoyment of people.

4 Images and perceptions in engineering

As Blockley (2005: vii) notes, the different stages of the design of an engineering structure cannot be disconnected and they are mainly envisaged in the form of images. It appears that engineers visualise their projects in images before putting them into words. The professional builds up a visual representation of the entire process right from the beginning until its termination.

For example, Figure 6 shows the prototypical visual representation of a cable-stayed bridge (a) and of a suspension bridge (b), as well as the distribution of forces. To explain technicalities and structural principles concerning these bridges, engineers prefer to use images like these rather than using words or words alone. A Spanish engineer could communicate fairly well with a German engineer in this way without speaking each other's languages.

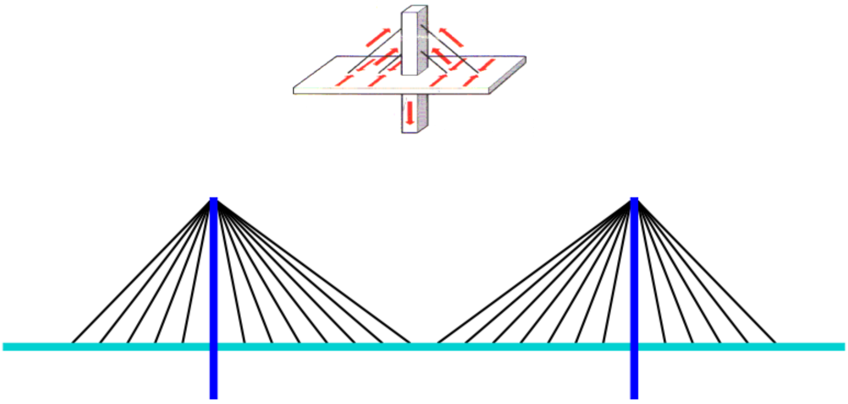

Figure 6 (a). Cable-stayed bridge: prototypical representations.

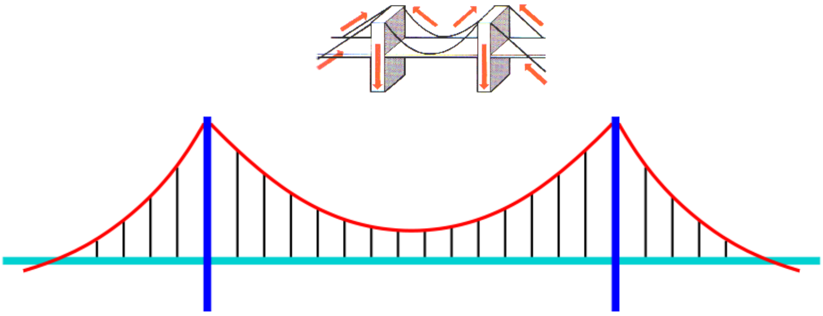

Figure 6 (b). Suspension bridge: prototypical representations.

As shown in previous research (Caballero 2003a, 2003b; Roldán & Úbeda 2006), there are a considerable number of terms in architecture and engineering construction that evoke a visual origin and description. To portray their designs and creations, engineers and architects prefer to use drawings and figures that are mostly images and that therefore activate visual interpretation in the beholder. Hence, when wishing to describe their work in words, they choose pictographic phrases, like *the jagged fan of five overscaled concrete fins* (Caballero 2003b: 150). Despite rivalries over professional competences and responsibilities, if there is one thing that architects and engineers have in common, it is the visual thinking of their work. In interviews Santiago Calatrava, the well-known Spanish architect and civil engineer, has acknowledged about his own *modus operandi*:

> You see indeed I, I, I draw very much, constantly, among other things because in the communication you see a drawing or you see or a sign is more important than one thousand words so. ... Drawing is the laboratory of my ideas, their first expression. My hand motions speak even before my mouth is aware of them. (Calatrava *s. d.*; Bet Levi 2008)

In a way, an important (and difficult) skill that both architects and engineers must acquire during their training is verbalising, putting their mental images into spoken and written words, which probably explains why metaphor or metonymy is so common. Caballero (2003a, 2003b) has examined the occurrence of conceptual metaphor and, particularly of image metaphor, in architecture. Many of the examples that she presents from her collected corpus have a visual origin and nature. In addition, she points out that it is often not so easy to differentiate conceptual metaphor from image metaphor in architecture texts, claiming that there is often interplay between the two types, because of "the visual and aesthetic constraints of the discipline" (2003b: 150). Adding to that, we would also like to underline the key role of the visual component in engineering, as well as the (frequently underestimated) aesthetic element. In fact, this issue can be tested in many historic examples, such as the Segovia Aqueduct or the Great Wall of China. In Roldán & Úbeda (2006: 538), additional evidence indicates a considerable use of metonymic images in descriptive engineering construction texts.

Another feature in common for architects and engineers is the frequent presence of embodiment in their conceptual mappings and, as we will show in the examples below, in image blending. This is also reflected in their use of metaphors from the medical domain. Quoting Calatrava again:

> Yes, and it means you see that in your body almost is architecture, so indeed you see if you put your hands together you see or, or your face you see the expression of your mouth, you see even your, the proportions of your body, all those things you see has an archi..., let's say are patterns of understanding of architecture. [s.d.]

This way of reasoning explains the ubiquity of the human figure in engineering metaphorical mappings and blends, part of which we explained above in the STRUCTURES AS PATIENTS and ENGINEERS AS DOCTORS mappings. This feature arises from considering structures as being as fragile as human beings and therefore requiring medical attention. Let us look at how these blends operate together in images. We can see in Figure 7 an example of how the moving shape of the human body inspired Calatrava in the "Turning Torso" high-rise building in Malmö (Sweden).

Figure 7. The "Turning Torso" building (Malmö) and its analogy with the human body.

From the input of the images of human body movements stored in his memory, and from the input of his knowledge as an architect and engineer, Calatrava has been able to design this building. Here he has succeeded in fusing in the building image the conceptual blends of the "anthropology" of the building (its aesthetic aspect) and the engineering structural principles that make it inhabitable. In the earliest stages of a building's design the engineer will use sketches, computer models and calculations to seek out the best solution for the particular building. Such aspects as the direction that the building faces, the materials that are used to construct it, the types of glass and the interaction with the local climate will all need to be modelled and optimized and this is done with images. In the example in Figure 8, we can see an eye-catching image demonstrating with actual people the load distribution principles applied in the Forth Rail Bridge of Scotland (built in 1887). The sketch above the men shows the weight of the central span of the bridge being transmitted to the banks through diamond-shaped supports. The central "weight" is Kaichi

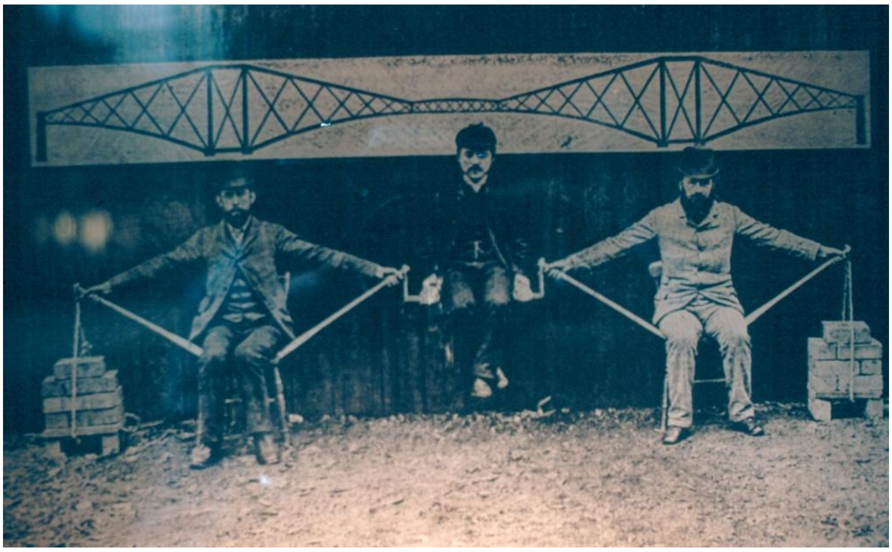

Figure 8. Load distributions in the Firth of Forth Bridge (Scotland, UK).

Watanabe, a Japanese engineer; Sir John Fowler and Sir Benjamin Baker, the bridge designers, provide the supports.

5 Image blending: representation and interpretation

In addition, the bridge designer will sometimes attempt to represent a superimposed image in the actual shape of the bridge. In these cases, it is not only the utility of the bridge that matters, but also its iconic representation. Calatrava, for instance, frequently elaborates his works as *artefact*s and *sculptures*. Thus the Alamillo Bridge (Figure 9), designed as a portico to the 1992 Seville Expo, has been commonly perceived and interpreted as a harp, a fan and a swan over the Guadalquivir River. Therefore, apart from its prototypical use as a bridge to cross a river, the iconic interpretation of the bridge depends upon the conceptual relations of representation, analogy and intentionality.

Figure 9. The Alamillo Bridge, Seville.

There are a whole set of conceptual relations, however, that go back to the moment when there was no bridge, only blocks of concrete to be constructed. We can see an evolution, i.e. how some blocks of concrete can become a unique and practical structure. Let us consider the relations involved in the process:

- Change: transformation from one state to the final product.
- Cause-effect: The size changes, the structure is created as such: there is a compression implied.
- Identity: it is the same concrete, but now with a different shape (compressed with time produces uniqueness in the end).
- Time: connected to the cause-effect and change relations.
- Part-whole: the concrete blocks are transformed into a bridge (cause-effect). In the blend, they are fused.
- Space: the concrete was transported to its final place over the river.

- Role: related to its value—the role of the bridge was to be the gateway to the 1992 Seville Expo, i.e. a symbol of the city.
- Representation (the thing represented): the Alamillo Bridge, not the Golden Gate Bridge.
- Analogy/Similarity: A harp and a fan—this has the compression of the aesthetic effect (cause-effect and role-value).
- Category: started as analogy and becomes compressed into a category relation: it is a fan, the Malmo building is a torso.
- Property: A safe bridge—it causes you to feel safe when crossing it.
- Intentionality: The designer desired and sought the effect of creating a city symbol.

From all the activated conceptual relations, let us consider the relations of analogy/similarity; role-value and cause-effect occurring in this example. From the analogy projected from the inputs of the shape of the bridge like a swan, there is the resulting compression of the bridge as an aquatic bird and the aesthetic blend of the beauty of the swan, which metonymically becomes the beauty of the bridge. The mapping in the blend is iconic because the form (the swan) reflects the meaning (the bridge). It also reflects the intentionality of its design to turn the bridge shape into a symbol. In the case of the representation of the bridge as a harp, there are additional other compressed effects, such as the musical sound of the water. The interpretation of the bridge as a fan entails folkloric local elements associated with the host city, Seville, which are added to the compression. Calatrava himself has acknowledged that he envisages the bridge as a dialogue between the deck and the pylon sustaining it.

Let us consider now another bridge, located in Athens (Greece), the Katehaki bridge, conceived by Calatrava as an ancient Greek vessel, as shown in Figure 10.

Figure 10. The Katehaki Bridge, Athens.

The image blend of the bridge as a vessel that transports people over the river is achieved, since it is only a pedestrian bridge. On the other hand, this is an ancient Greek vessel built in Athens, which is the metonymic compression that Calatrava intended to convey, since:

> If the bridge is really successful, we can identify the place, and sometimes even the city itself, by means of it, as in the case of the Golden Gate Bridge in San Francisco, for example. (Bet Levi 2008)

Finally, as we have seen above, engineers operate with multiple spaces and blends, among which the medical domain is an important productive one. These conceptual integrations can be automatically activated when needed. The engineer must display what Fauconnier & Turner call *global insights* (2002: 84). This phenomenon also occurs in sports. For instance, a basketball player knows about different strategies for shooting or defence “by heart”, because of previous and intensive training. So the player must have a good knowledge of cause-effect consequences of the different moves executed when shooting or just passing the ball. The results will depend upon the level of expertise of the players. The engineer must be prepared to anticipate different situations too. This leads to “expert performance”, and to the application of global insights, where the cause-effect progression should be crystal clear.

6 Conclusions

This paper has explored the significance and the scope of medical metaphoric mappings and conceptual blends in civil engineering practice. Similarities, analogies, disanalogies and other vital conceptual relations are revealed by a set of correspondences between entities in the two domains. Despite their contrasting frames, elements and roles, both engineers and doctors have to allow for errors in their practice. Engineering is not an exact science and neither is medicine. Both professionals are practitioners trying to calculate unpredicted factors.

Likewise, an important feature of engineering practice is making an extensive use of images (pictures, sketches, diagrams, graphs) when thinking and reasoning, hence the widespread occurrence of image-metaphors in their conversations and texts. The representation—and interpretation—of images appears to be more direct, immediate, holistic and eye-catching than the use of words, hence the use of iconic designs and creations. It is suggested here that within the field of civil engineering, not only are images a complement of words, but also words’ main function seems to be the description of images.

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Illustrations acknowledgement:

Figures 6 : http://en.wikipedia.org/wiki/Cable-stayed_bridge
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Figure 8: http://www.en.wikipedia.org/wiki/Forth_Railway_Bridge
Figure 9: http://en.wikipedia.org/wiki/Seville
Figure 10: http://farm4.static.flickr.com/3083/2568224425_90fc1ee9f1.jpg?v=0